

Surface Tension of Ozone-Safe Mixture Refrigerants

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Surface tension is one of the least studied thermodynamic properties of ozone-safe refrigerants. Small number of published experimental data on it, not taking into account variations of vapor and liquid phase concentrations during the measurement – all hamper analytical treatment of obtained information and lead to significant methodological errors at working out database for surface tension of many-component refrigerants. Besides, solving of this problem is hampered by the absence of correct methods for studying temperature-and-concentration dependence of surface tension of solutions in wide regions of state parameters. The character of behavior of excess functions of binary and ternary mixtures remains poor studied.

In this article literature information about surface tension of mixtures of ozone-safe refrigerants was analyzed. The question on varying vapor and liquid phase concentrations of zeotrope mixture samples in the measuring cell, realizing the method of capillary rising, was studied. On the base of the results of measurements we have concluded that the assumption on invariability of concentration of the sample during measurement of surface tension of zeotropic mixtures in wide temperature interval was wrong. So, the most reliable information is experimental data obtained in the regions of parameters where the variation of liquid phase composition with temperature rising can be neglected.

Analyze of temperature and concentration dependence of mixtures R32/R134a, R32/R125, R143a/R134a, R125/R143a, R125/R134a, R134a/R152a, R125/R134a/R143a, R125/R134a/R32 has been made with the model of prediction, which realized the main principles of the scaling. The character of varying of excess function of surface tension for these mixtures was studied in detail. The reference data tables have been calculated at the values of parameters beginning from the temperature of crystallization till the critical point one for the following refrigerants: R404A, R407A, R407B, R407C, R407D, R407E, R410A, R410B, R507A. Calculated values of surface tension and experimental data on it have been adjusted.. Recommendation for working out the reference data tables of surface tension of mixture refrigerants have been formulated.